CLAIMS

What is claimed is:

1. A fiber optic sensing system for use in a remote location, comprising:

an optical fiber adapted to carry an optical signal from a starting location towards a remote location;

the fiber adapted to transmit at least one information-carrying signal from the remote location towards the starting location;

the information-carrying signal carrying information related to a parameter that is sensed in the remote location;

the fiber operated in a region of negative chromatic dispersion; and

the optical signal being at a power level sufficient to generate modulation instability if the fiber were operated in a region of positive chromatic dispersion.

2. The system of claim 1, further comprising an electro optical unit connected to the fiber.

3. The system of claim 2, wherein the unit extracts the information from the information-carrying signal.

4. The system of claim 1, wherein the optical signal is subject to a level of modulation instability that does not inhibit a proper measurement of the information-carrying signal.

5. The system of claim 1, wherein the optical signal is subject to a level of modulation instability that enables the proper measurement of the information-carrying signal.

6. The system of claim 1, wherein the parameter comprises at least one of temperature, strain, pressure, distributed temperature, distributed strain, distributed pressure, flow, density, resistivity, acoustic pressure, acceleration, or chemical properties.

7. The system of claim 1, wherein the fiber transmits the information-carrying signal from a sensor.

8. The system of claim 7, wherein the sensor is an intrinsic sensor.

9. The system of claim 7, wherein the sensor is an extrinsic sensor.

10. The system of claim 1, wherein the fiber is adapted to sense the parameter.

11. The system of claim 1, wherein the information-carrying signal comprises Brillouin scattering.

12. The system, of claim 1, wherein the remote location comprises one of a wellbore, a pipeline, an electrical power cable, an industrial process, a fire alarms, a tunnel, or a structure.

13. The system of claim 1, wherein the fiber is housed in a conduit.

14. The system of claim 13, wherein the fiber is pumped into the conduit.

15. The system of claim 1, wherein the fiber is a dispersion shifted fiber.

16. The system of claim 1, wherein the fiber is operated at wavelengths shorter than the wavelength of zero dispersion.

17. The system of claim 16, wherein the fiber is operated at wavelengths that are longer than a second mode cut-off wavelength.

18. A method for sensing a parameter in a remote location, comprising:

providing a fiber;

carrying an optical signal through the fiber from a starting location towards a remote location;

operating the fiber in a region of negative chromatic dispersion;

carrying the optical signal at a power level sufficient to generate modulation instability if the fiber were operated in a region of positive chromatic dispersion

sensing a parameter in the remote location; and

transmitting at least one information-carrying signal through the fiber from the remote location towards the starting location, the information-carrying signal carrying information related to the parameter.

19. The method of claim 18, further comprising connecting an opto electronic unit to the fiber.

20. The method of claim 18, further comprising extracting the information from the information-carrying signal.

21. The method of claim 18, wherein the carrying step comprises carrying the optical signal so that the optical signal is subject to a level of modulation instability that does not inhibit a proper measurement of the information-carrying signal.

22. The method of claim 18, wherein the carrying step comprises carrying the optical signal so that the optical signal is subject to a level of modulation instability that enables the proper measurement of the information-carrying signal.

23. The method of claim 18, wherein the parameter comprises at least one of temperature, strain, pressure, distributed temperature, distributed strain, distributed pressure, flow, density, resistivity, acoustic pressure, acceleration, or chemical properties.

24. The method of claim 18, wherein the sensing step comprises sensing the parameter with a sensor and the transmitting step comprises transmitting the information-carrying signal from the sensor.

25. The method of claim 24, wherein the sensor is an internal sensor.

26. The method of claim 24, wherein the sensor is an external sensor.

27. The method of claim 18, wherein the sensing step comprises sensing the parameter with the fiber.

28. The method of claim 18, wherein the information-carrying signal comprises Brillouin scattering.

29. The method of claim 18, wherein the remote location comprises one of a wellbore, a pipeline, an electrical power cable, an industrial process, a fire alarms, a tunnel, or a structure.

30. The method of claim 18, further comprising housing the fiber in a conduit.

31. The method of claim 30, further comprising pumping the fiber into the conduit.

32. The method of claim 18, wherein the fiber is a dispersion shifted fiber.

33. The method of claim 18, further comprising operating the fiber at wavelengths shorter than the wavelength of zero dispersion.

34. The method of claim 33, further comprising operating at wavelengths that are longer than a second mode cut-off wavelength.